



Lowell Regional Wastewater  
451 First Street Boulevard  
Lowell, MA 01854  
Attn: Tom Kawa

6/27/2018

Dear Mr. Kawa,

Enclosed please find the toxicological evaluation and chemical analyses report for the effluent received on June 4, 2018. This is your 2018 Stormwater bioassay report. Please call me at (401) 353-3420 if you have any questions.

Sincerely,

Michael McCallum  
Technical Laboratory Director

NEW ENGLAND TESTING LABORATORY, INC.

59 Greenhill St., West Warwick, RI 02893

(401) 353-3420

TOXICOLOGICAL EVALUATION  
AND CHEMICAL ANALYSES  
OF EFFLUENT:  
NPDES Permit # MA0100633  
Stormwater 2018 Sample

Prepared For:  
Lowell Regional Wastewater  
451 First Street Boulevard  
Lowell, MA 01854

June 27, 2018

By  
New England Testing Laboratory, Inc.  
59 Greenhill Street  
West Warwick, RI 02893

NETLAB CASE NUMBER: 8F04053



New England Bioassay

A Division of GZA



GEOTECHNICAL

ENVIRONMENTAL

ECOLOGICAL

WATER

CONSTRUCTION  
MANAGEMENT

77 Batson Drive  
Manchester, CT 06042  
T: 860.643.9560  
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## ACUTE AQUATIC TOXICITY TEST REPORT

**Lowell Regional Wastewater Utilities  
Lowell, Massachusetts  
NPDES Permit: MA0100633**

Test Start Date: 6/5/18

Test Period: June 2018

Report Prepared by:

New England Bioassay  
A Division of GZA GeoEnvironmental, Inc.  
77 Batson Drive  
Manchester, CT 06042

NEB Project Number: 05.0044476.00

Report Date: June 26, 2018

Report Submitted to:

New England Testing Laboratories  
59 Greenhill Street  
West Warwick, RI 02893

Sample ID: Stormwater

This report shall not be reproduced, except in its entirety, without written approval of New England Bioassay (NEB). NEB is the sole authority for authorizing edits or modifications to the data contained in this report. Test results relate only to samples analyzed. Please contact the Lab Manager, Kimberly Wills, at 860-858-3153 or [kimberly.wills@gza.com](mailto:kimberly.wills@gza.com) if you have any questions concerning these results.

## Whole Effluent Toxicity Testing Report Instruction Form

Client Name/Project: NET/Lowell Test Date: 6/5/18

Sample ID: Semi-annual Stormwater

### Your results were as follows:

☒ Pass

- ☐ Fail – Please proceed according to the instructions in your permit.
- ☐ Invalid – **Retesting is still required. Retest report will be sent at a later date under separate cover.**
- ☐ Original Test Invalid – **Valid retest performed. Both test and retest results are attached.**
- ☐ Retesting will be or has been performed according to the Case 1 Protocols outlined in the attached copy of EPA-New England's species-specific, self-implementing policy for alternate dilution water.
- ☐ This is your \_\_\_\_\_ case of dilution water toxicity. Please proceed according to the Case 2 Protocols outlined in the attached copy of EPA-New England's species-specific, self-implementing policy for alternate dilution water. The alternate dilution water you select for future tests for this species should be described as follows: "synthetic laboratory water made up according to EPA's toxicity test protocols, by adding specified amounts of salts into deionized water in order to match the hardness of our receiving water." Writing this letter should help you to avoid retests in the future.
- ☐ Available information is insufficient to determine whether this test passed or failed. Please compare results to your permit limits. Please submit a current copy of your permit to the NEB Lab so that we can determine the status of future tests results and help ensure your compliance with permit requirements.

### Please complete the items on this list before reporting these results according to the instructions in the "Monitoring and Reporting" Section of your permit.

- Please complete, sign and date the upper portion of the "Whole Effluent Toxicity Test Report Certification" page which is the page directly following this page.
- Fill in the Sample Type and Sample Method (upper right) and the Permit Limits (lower left) on the New England Bioassay, Inc.-EPA Toxicity Test Summary Sheet(s) if they are incomplete.
- Fill in any missing information on the NEB Chain-of-Custody documents. This includes ensuring that the following information is recorded: Sampler's name and title, Facility name and address, Sample collection methods, Sample collection start and end dates and times, Types of sample, Chlorination status of samples upon shipment to NEB, Site description and Sample collection procedures.
- Monitoring results should be summarized on your monthly Discharge Monitoring Report Form.
- Signed and dated originals of this report must be submitted to the State (and Federal) Agencies specified in the "Monitoring and Reporting" section of your permit.

**Questions? Please contact the Lab Manager, Kim Wills, at (860) 643-9560 or [kimberly.wills@gza.com](mailto:kimberly.wills@gza.com).**

**WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION** (Permittee)

I certify under penalty of law that this document and all ATTACHMENTS were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on \_\_\_\_\_

[Date]

\_\_\_\_\_  
[Authorized Signature]

\_\_\_\_\_  
[Print or Type Name and Title]

\_\_\_\_\_  
[Print or Type the Permittee's Name]

\_\_\_\_\_  
[Print or Type the NPDES Permit No.]

Since the WET test and report check is complicated, the New England Bioassay Aquatic Toxicity Laboratory has certified the validity of the WET test data in the section below. Please note that this does not relieve the permittee from its responsibility to sign and certify the report under 40 C.F.R. S 122.41(k).

**WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION** (Bioassay Laboratory)

I certify under penalty of law that this document and all ATTACHMENTS were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on \_\_\_\_\_

[Date]

\_\_\_\_\_  
[Authorized Signature]

\_\_\_\_\_  
Kim Wills, Laboratory Manager

[Print or Type Name and Title]

\_\_\_\_\_  
New England Bioassay

[Print or Type Name of Bioassay Laboratory]

**24. Telephone Contacts**

If you have questions, please contact Joy Hilton, Water Technical Unit, at (617) 918-1877 or David McDonald, Ecosystem Assessment Unit, at (617) 918-8609.

NEW ENGLAND BIOASSAY, A DIVISION OF GZA EPA TEST SUMMARY SHEET

Facility Name: Lowell RWWU Test Start Date: 6/5/18  
 NPDES Permit Number: MA0100633 Outfall Number: \_\_\_\_\_

<u>Test Type</u>	<u>Test Species</u>	<u>Sample Type</u>	<u>Sample Method</u>
<input checked="" type="checkbox"/> Acute	<input type="checkbox"/> Fathead Minnow	<input type="checkbox"/> Prechlorinated	<input checked="" type="checkbox"/> Grab
<input type="checkbox"/> Chronic	<input checked="" type="checkbox"/> Ceriodaphnia	<input checked="" type="checkbox"/> Dechlorinated	<input type="checkbox"/> Composite
<input type="checkbox"/> Modified	<input type="checkbox"/> Daphnia Pulex	<input type="checkbox"/> Chlorine Spiked in Lab	<input type="checkbox"/> Flowthru
<input type="checkbox"/> (chronic reporting	<input type="checkbox"/> Mysid Shrimp	<input type="checkbox"/> Chlorinated on site	<input type="checkbox"/> Other
<input type="checkbox"/> acute values)	<input type="checkbox"/> Sheepshead	<input type="checkbox"/> Unchlorinated	
<input type="checkbox"/> 24hr screening	<input type="checkbox"/> Menidia		
	<input type="checkbox"/> Sea Urchin		
	<input type="checkbox"/> Champia		
	<input type="checkbox"/> Selenastrum		

Dilution Water

☐ receiving water collected at a point upstream of or away from the discharge, free from toxicity or other sources of contamination; (Receiving water name: \_\_\_\_\_)

☐ alternate surface water of known quality and a hardness, etc. to generally reflect the characteristics of the receiving water; (Surface water name: \_\_\_\_\_)

☒ synthetic water prepared using either Millipore Mill-Q or equivalent deionized water and reagent grade chemicals; or deionized water combined with mineral water;

☐ or artificial sea salts mixed with deionized water;

☐ deionized water and hypersaline brine; or

☐ other \_\_\_\_\_

Effluent sampling date (s): 6/4/18

Effluent concentrations tested (in%): 0 6.25 12.5 25 50 100

\* Permit limit concentration: ≥ 100%

Was effluent salinity adjusted? No If yes, to what value? N/A ppt

With sea salts? N/A Hypersaline brine solution? N/A

Actual effluent concentrations tested after salinity adjustment (%): 0 6.25 12.5 25 50 100

Reference Toxicant test date: 6/4/18

Test Acceptability Criteria

Mean Control Survival: <u>N/A</u>	Mean Control Reproduction: <u>N/A</u>
Mean Diluent Survival: <u>100%</u>	Mean Diluent Reproduction: <u>N/A</u>
Mean Control Weight: <u>N/A</u>	Mean Control Cell Count: <u>N/A</u>
Mean Diluent Weight: <u>N/A</u>	Mean Diluent Cell Count: <u>N/A</u>

	<u>Limits</u>		<u>Results</u>
LC50	<u>≥ 100%</u>	LC50	<u>&gt;100%</u>
		Upper Value	<u>±∞</u>
		Lower Value	<u>100%</u>
		Data Analysis	
		Method Used	<u>Graphical</u>
A-NOEC	<u>N/A</u>	A-NOEC	<u>100%</u>
C-NOEC	<u>N/A</u>	C-NOEC	<u>-----</u>
		LOEC	<u>-----</u>
IC25	<u>N/A</u>	IC25	<u>-----</u>
IC50	<u>N/A</u>	IC50	<u>-----</u>

## CERIODAPHNIA DUBIA AQUATIC TOXICITY TEST REPORT

**Test Reference Manual:** EPA 821-R-02-012, "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater Organisms and Marine Organisms", Fifth Edition

**Test Method:** *Ceriodaphnia dubia* Acute Toxicity Test – Method 2002.0

**Test Type:** Acute Static Non-Renewal Freshwater Test

**Temperature :** 25 ± 1°C

**Light Quality:** Ambient Laboratory Illumination

**Photoperiod:** 16 hours light, 8 hours dark

**Test Chamber Size:** 30 mL

**Test Solution Volume:** Minimum 25 mL

**Age of Test Organisms:** 1-24 hours (neonates)

**Number of Daphnids Per Test Chamber:** 5

**Number of Replicate Test Chambers Per Treatment:** 4

**Total Number of Daphnids Per Test Concentration:** 20

**Feeding Regime:** Fed YCT and *Selenastrum* while holding prior to initiating test as per manual.

**Aeration:** None

**Dilution Water:** NEB Lab Synthetic Soft Water (hardness 40 to 48 mg/L)

**Effluent Concentrations:** 0%, 6.25%, 12.5%, 25%, 50% and 100% effluent

**Test Duration:** 48 hours

**Effect measured:** Mortality – no movement of body/appendages on gentle prodding.

**Test Acceptability:** ≥ 90% survival of test organisms in control solution Yes X No   

**Sampling Requirements:** Samples first used within 36 hours of collection Yes X No   

**Sample Volume Required:** Minimum 1 liter

**Test Organism Source:** NEB

**Test Acceptability Criteria:** Mean Alternate Water Control Survival = N/A  
Mean Dilution Water Control Survival = 100%

<u>Test Results:</u>	<u>Limits</u>	<u>Results</u>	<u>Status</u>
48-hour LC50	≥ 100%	>100%	Pass <u>X</u> Fail <u>  </u>
Upper Value		±∞	
Lower Value		100%	
Data Analysis Method Used		<u>Graphical</u>	
A-NOEC		100%	

<b><u>Reference Toxicant Data:</u></b>	<b><u>Date:</u></b>	<u>6/4/18</u>
	<b><u>Toxicant:</u></b>	Sodium Chloride
	<b><u>Dilution Water:</u></b>	NEB Lab Synthetic Soft Water
	<b><u>Source:</u></b>	New England Bioassay
	<b><u>48-hour LC50:</u></b>	<u>1.59 g/L</u>
	<b><u>In Acceptable Range:</u></b>	Yes <u>X</u> No <u>        </u>

X Dechlorination was not required

\_ Sample was dechlorinated by adding sodium thiosulfate to the sample prior to test initiation. Since dechlorination of the effluent was necessary, a thiosulfate control of diluent water spiked with sodium thiosulfate was also included in the test series. Chlorine was \_\_\_\_\_ mg/L in a dechlorinated sample.

- Chlorine Measurement was elevated due to interference. Chlorine was \_\_\_\_\_ mg/L in a filtered sample.

Total Residual Chlorine was re-measured following aeration, and was found to be \_\_\_\_\_ mg/L.

**Additional Notes or Other Conditions Affecting the Test:**

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

# NEW ENGLAND BIOASSAY ACUTE TOXICITY DATA FORM

## COVER SHEET FOR LC50 TESTS

CLIENT: New England Testing Laboratory  
 ADDRESS: 59 Greenhill Street  
West Warwick, RI 02893  
 SAMPLE TYPE: Lowell RWU Stormwater  
 DILUTION WATER: Soft Reconstituted Freshwater

*C. dubia* TEST ID # 18-760  
 COC # C38-2299  
 PROJECT # 05.0044476.00

Sample Date(s): 6/4/18 Date Received: 5/4/18

### INVERTEBRATES

TEST SET UP (TECH INIT) KW  
 TEST SPECIES *Ceriodaphnia dubia*  
 NEB LOT# Cd18(6-5)  
 AGE < 24 hours  
 TEST SOLUTION VOLUME (mls) 30  
 NO. ORGANISMS PER TEST CHAMBER 5  
 NO. ORGANISMS PER CONCENTRATION 20  
 NO. ORGANISMS PER CONTROL 20

### LABORATORY CONTROL WATER:

		Hardness mg/L CaCO <sub>3</sub>	Alkalinity mg/L CaCO <sub>3</sub>
ARTIFICIAL FW:	NEB BATCH #	C38-S012	46
			35

	DATE	TIME
TEST START:	6/5/18	1605
TEST END:	6/7/18	1610

### RESULTS OF *Ceriodaphnia dubia* LC50 TEST

METHOD	LC50 (%)	95% Confidence Limits
BINOMIAL/GRAPHICAL	>100%	100%±∞
PROBIT		
SPEARMAN KARBUR		
NOAEL	100%	

NOEC: NO OBSERVABLE EFFECT CONCENTRATION

Comments:

REVIEWD BY:

DATE:

**NEW ENGLAND BIOASSAY  
Toxicity Test Data Sheet**

NEB Test #: 18-760

Project #: 05.0044476.00

Facility Name: Lowell RWU Stormwater

Date Sampled: 6/4/18

Date Received: 5/4/18

Sample ID: Stormwater

Test Organism: Ceriodaphnia dubia

Organism Age: < 24 hours

Test Duration: 48 (hours)

Beginning Date: 6/5/18 Time: 1605

Dilution Water Source: SRCF

Dilution Hardness: 46 ppm as CaCO<sub>3</sub>

Effluent Conc. %	Number of Surviving Organisms			Dissolved Oxygen (mg/L)			Temperature ( °C )			pH		
	KW	CB	TBP	CW	CB	KO	CW	CB	KO	CW	CB	KO
Initials	0	24	48	0	24	48	0	24	48	0	24	48
Diluent A	5	5	5	8.1	8.2	8.5	24.3	24.0	24.8	7.7	7.7	7.8
Diluent B	5	5	5			8.4			24.8			7.8
Diluent C	5	5	5			8.3			25.3			7.8
Diluent D	5	5	5			8.3			25.3			7.7
6.25 A	5	5	5	8.2	8.2	8.2	24.4	24.0	25.2	7.6	7.6	7.8
6.25 B	5	5	5			8.2			25.0			7.7
6.25 C	5	5	5			8.2			25.1			7.7
6.25 D	5	5	5			8.1			25.2			7.7
12.5 A	5	5	5	8.0	8.1	8.1	24.4	24.0	24.9	7.5	7.6	7.7
12.5 B	5	5	5			7.9			24.9			7.7
12.5 C	5	5	5			7.8			25.0			7.7
12.5 D	5	5	5			7.7			24.9			7.6
25 A	5	5	5	7.7	7.6	7.6	24.3	24.0	24.8	7.5	7.6	7.6
25 B	5	5	5			7.2			24.9			7.5
25 C	5	5	5			7.2			24.9			7.5
25 D	5	5	5			7.1			24.9			7.5
50 A	5	5	5	7.6	6.9	7.0	24.3	24.0	24.7	7.3	7.5	7.4
50 B	5	5	5			6.1			24.9			7.3
50 C	5	5	5			5.8			24.9			7.3
50 D	5	5	5			5.8			24.8			7.3

LC50	Confidence Interval	A-NOEC	Computational Method
>100%	100%±∞	100%	Graphical

## NEW ENGLAND BIOASSAY

### Toxicity Test Data Sheet

NEB Test #: 18-760

Test Organism: *Ceriodaphnia dubia*

Project #: 05.0044476.00

Organism Age: < 24 hours

Facility Name: Lowell RWU Stormwater

Test Duration: 48 (hours)

Date Sampled: 6/4/18

Beginning Date: 6/5/18 Time: 1605

Date Received: 5/4/18

Dilution Water Source: SRCF

Sample ID: Stormwater

Dilution Hardness: 46 ppm as CaCO<sub>3</sub>

[illegible]

LC50	Confidence Interval	A-NOEC	Computational Method
>100%	100%±∞	100%	Graphical

# CETIS Analytical Report

Report Date: 19 Jun-18 16:14 (p 1 of 2)  
Test Code/ID: 18-760 / 04-6574-7841

## Ceriodaphnia 48-h Acute Survival Test

New England Bioassay

Analysis ID: 10-8024-5353	Endpoint: 48h Survival Rate	CETIS Version: CETISv1.9.4
Analyzed: 19 Jun-18 16:13	Analysis: Nonparametric-Control vs Treatments	Status Level: 1
Batch ID: 14-6074-7010	Test Type: Survival (48h)	Analyst:
Start Date: 05 Jun-18 16:05	Protocol: EPA/821/R-02-012 (2002)	Diluent: Soft Synthetic Water
Ending Date: 07 Jun-18 16:10	Species: Ceriodaphnia dubia	Brine:
Test Length: 48h	Taxon: Branchiopoda	Source: In-House Culture Age: <24
Sample ID: 04-5560-0650	Code: 1B27EA0A	Project:
Sample Date: 04 Jun-18 11:00	Material: stormwater	Source: Lowell RWWU (MA0100633)
Receipt Date: 04 Jun-18 15:50	CAS (PC):	Station:
Sample Age: 29h	Client: New England Testing Labs	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Angular (Corrected)	C > T	100	>100	n/a	1

## Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		6.25	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		12.5	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		25	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		50	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		100	18	10	1	6	Asymp	0.8333	Non-Significant Effect

## Test Acceptability Criteria

### TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	1	0.9	>>	Yes	Passes Criteria

## ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	5	65540	<1.0E-37	Significant Effect
Error	0	0	18			
Total	0		23			

## 48h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
12.5		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
50		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
100		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%

## Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
6.25		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
12.5		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
25		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
50		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
100		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%

# CETIS Analytical Report

Report Date: 19 Jun-18 16:14 (p 2 of 2)  
 Test Code/ID: 18-760 / 04-6574-7841

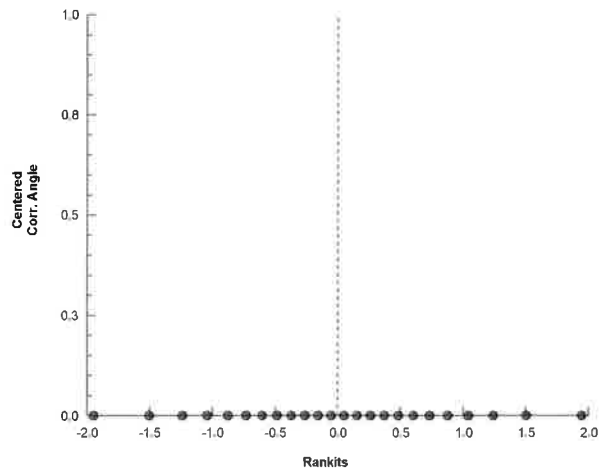
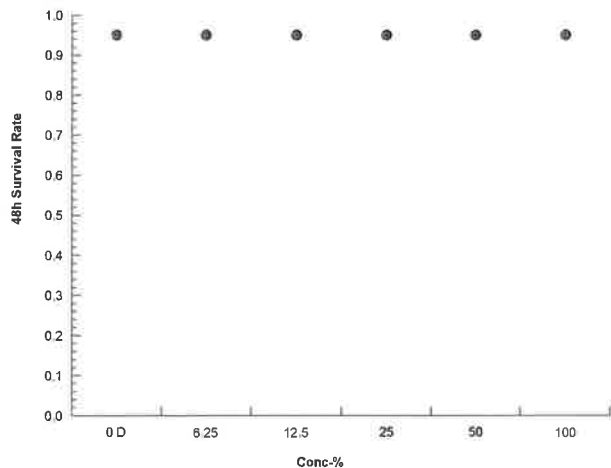
Ceriodaphnia 48-h Acute Survival Test			New England Bioassay		
Analysis ID:	10-8024-5353	Endpoint:	48h Survival Rate	CETIS Version:	CETISv1.9.4
Analyzed:	19 Jun-18 16:13	Analysis:	Nonparametric-Control vs Treatments	Status Level:	1

48h Survival Rate Detail					
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

Angular (Corrected) Transformed Detail					
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.345	1.345	1.345	1.345
6.25		1.345	1.345	1.345	1.345
12.5		1.345	1.345	1.345	1.345
25		1.345	1.345	1.345	1.345
50		1.345	1.345	1.345	1.345
100		1.345	1.345	1.345	1.345

48h Survival Rate Binomials					
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

## Graphics



## CETIS Analytical Report

Report Date: 19 Jun-18 16:14 (p 1 of 2)  
 Test Code/ID: 18-760 / 04-6574-7841

## Ceriodaphnia 48-h Acute Survival Test

New England Bioassay

Analysis ID: 11-4001-4191	Endpoint: 48h Survival Rate	CETIS Version: CETISv1.9.4
Analyzed: 19 Jun-18 16:13	Analysis: Linear Interpolation (ICPIN)	Status Level: 1
Batch ID: 14-6074-7010	Test Type: Survival (48h)	Analyst:
Start Date: 05 Jun-18 16:05	Protocol: EPA/821/R-02-012 (2002)	Diluent: Soft Synthetic Water
Ending Date: 07 Jun-18 16:10	Species: Ceriodaphnia dubia	Brine:
Test Length: 48h	Taxon: Branchiopoda	Source: In-House Culture Age: <24
Sample ID: 04-5560-0650	Code: 1B27EA0A	Project:
Sample Date: 04 Jun-18 11:00	Material: stormwater	Source: Lowell RWWU (MA0100633)
Receipt Date: 04 Jun-18 15:50	CAS (PC):	Station:
Sample Age: 29h	Client: New England Testing Labs	

## Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X)	Linear	1600871	200	Yes	Two-Point Interpolation

## Test Acceptability Criteria

## TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	1	0.9	>>	Yes	Passes Criteria

## Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
LC50	>100	n/a	n/a	<1	n/a	n/a

## 48h Survival Rate Summary

## Calculated Variate(A/B)

## Isotonic Variate

Conc-%	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	A/B	Mean	%Effect
0	D	4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	20/20	1	0.0%
6.25		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	20/20	1	0.0%
12.5		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	20/20	1	0.0%
25		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	20/20	1	0.0%
50		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	20/20	1	0.0%
100		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	20/20	1	0.0%

## 48h Survival Rate Detail

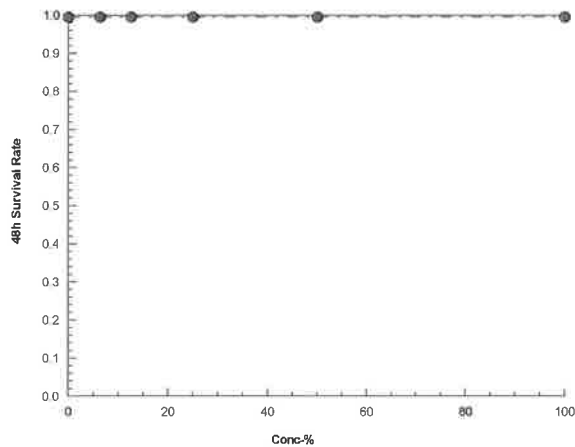
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

## 48h Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

Ceriodaphnia 48-h Acute Survival Test			New England Bioassay
Analysis ID: 11-4001-4191	Endpoint: 48h Survival Rate	CETIS Version: CETISv1.9.4	
Analyzed: 19 Jun-18 16:13	Analysis: Linear Interpolation (ICPIN)	Status Level: 1	

Graphics



## INITIAL CHEMISTRY INFORMATION

CLIENT:

Lowell Stormwater

PROJECT #

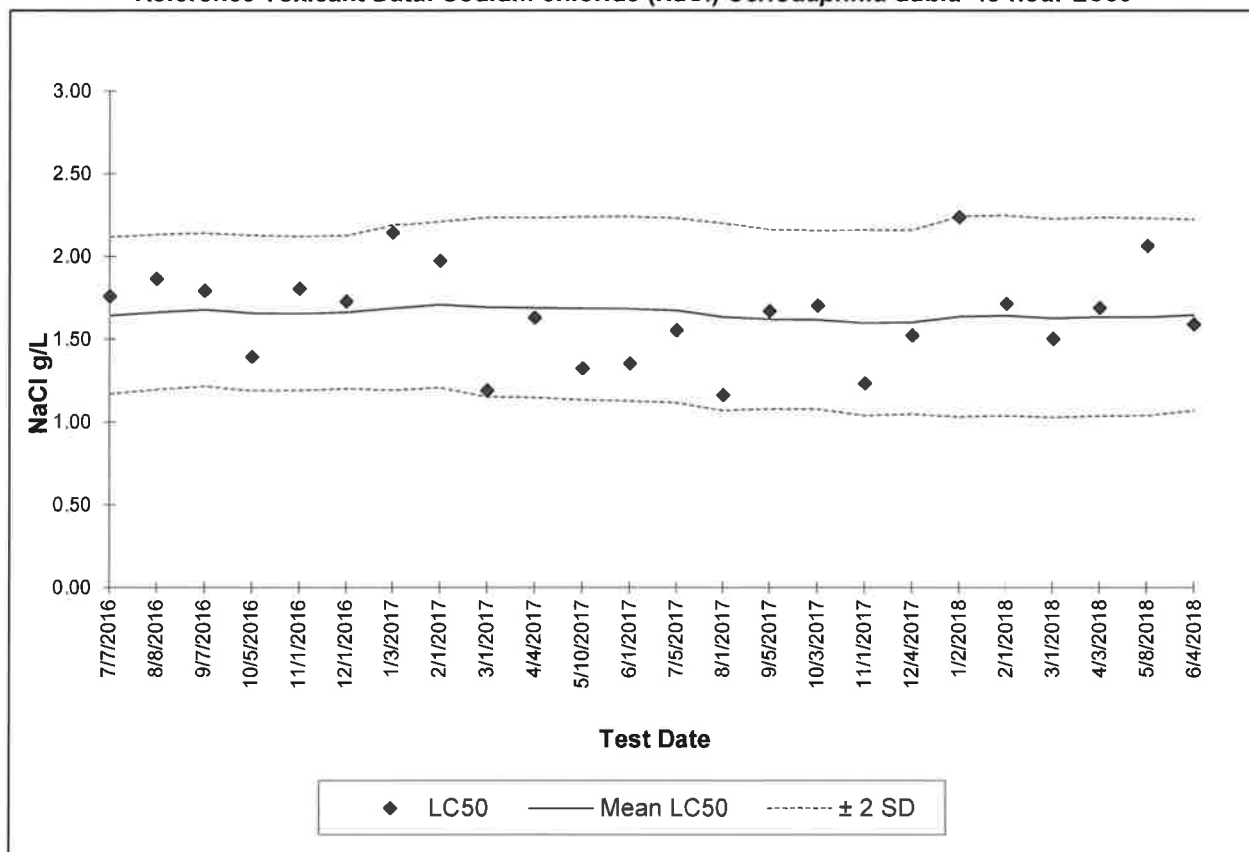
05.0044476.00

RECEIPT DATE	6/4/18
SAMPLE	Effluent
COC #	C38-2299
Temperature (°C)	8.1
Dissolved Oxygen (mg/L)	6.4
pH (standard units)	6.5
Conductivity (µmhos/cm)	1,105
Salinity (ppt)	<1
Hardness (as mg/L CaCO <sub>3</sub> )	86
Alkalinity (as mg/L CaCO <sub>3</sub> )	100
TRC - DPD (mg/L)	0.057*
INITIALS	DD

Additional notes:

\*TRC reading was <0.05 mg/L by amperometric titration.

**New England Bioassay**  
**Reference Toxicant Data: Sodium chloride (NaCl) *Ceriodaphnia dubia* 48-hour LC50**



Test ID	Date	LC <sub>50</sub>	Mean LC <sub>50</sub>	STD	-2 STD	+2 STD	CV	CV National 75th %	CV National 90th %
16-885	7/7/2016	1.76	1.64	0.24	1.17	2.12	0.14	0.29	0.34
16-1156	8/8/2016	1.86	1.66	0.23	1.19	2.13	0.14	0.29	0.34
16-1252	9/7/2016	1.79	1.68	0.23	1.22	2.14	0.14	0.29	0.34
16-1466	10/5/2016	1.39	1.66	0.23	1.19	2.13	0.14	0.29	0.34
16-1586	11/1/2016	1.80	1.66	0.23	1.19	2.12	0.14	0.29	0.34
16-1730	12/1/2016	1.73	1.66	0.23	1.20	2.13	0.14	0.29	0.34
17-5	1/3/2017	2.14	1.69	0.25	1.19	2.19	0.15	0.29	0.34
17-147	2/1/2017	1.97	1.71	0.25	1.21	2.21	0.15	0.29	0.34
17-274	3/1/2017	1.19	1.69	0.27	1.15	2.24	0.16	0.29	0.34
17-475	4/4/2017	1.63	1.69	0.27	1.15	2.23	0.16	0.29	0.34
17-695	5/10/2017	1.32	1.69	0.28	1.13	2.24	0.16	0.29	0.34
17-772	6/1/2017	1.35	1.68	0.28	1.13	2.24	0.17	0.29	0.34
17-968	7/5/2017	1.55	1.67	0.28	1.12	2.23	0.17	0.29	0.34
17-1140	8/1/2017	1.16	1.64	0.28	1.07	2.20	0.17	0.29	0.34
17-1325	9/5/2017	1.67	1.62	0.27	1.08	2.16	0.17	0.29	0.34
17-1521	10/3/2017	1.70	1.62	0.27	1.08	2.16	0.17	0.29	0.34
17-1689	11/1/2017	1.23	1.60	0.28	1.04	2.16	0.18	0.29	0.34
17-1828	12/4/2017	1.52	1.60	0.28	1.05	2.16	0.17	0.29	0.34
18-5	1/2/2018	2.24	1.64	0.30	1.03	2.24	0.18	0.29	0.34
18-179	2/1/2018	1.71	1.64	0.30	1.04	2.25	0.18	0.29	0.34
18-290	3/1/2018	1.50	1.63	0.30	1.03	2.23	0.18	0.29	0.34
18-465	4/3/2018	1.69	1.64	0.30	1.04	2.24	0.18	0.29	0.34
18-653	5/8/2018	2.06	1.64	0.30	1.04	2.23	0.18	0.29	0.34
18-749	6/4/2018	1.59	1.65	0.29	1.07	2.23	0.18	0.29	0.34

## Results:

**Sample: Semi Annual Whole Eff  
8F04053-01 (Water)**

### General Chemistry

	Result	Reporting Limit	Units	Date Analyzed
<b>Ammonia</b>	<b>11.8</b>	0.5	mg/L	06/08/18
<b>Kjeldahl Nitrogen</b>	<b>12.3</b>	1.0	mg/L	06/06/18
<b>Nitrate and Nitrite as N</b>	<b>4.82</b>	0.15	mg/L	06/06/18
<b>Total Dissolved Solids</b>	<b>524</b>	10	mg/L	06/06/18
<b>Total Organic Carbon</b>	<b>14.6</b>	1.0	mg/L	06/08/18
<b>Total Phosphorous</b>	<b>3.11</b>	0.10	mg/L	06/05/18
<b>Total solids (TS)</b>	<b>644</b>	10	mg/L	06/05/18
<b>Total Suspended Solids</b>	<b>61</b>	4	mg/L	06/07/18

### Total Metals

	Result	Reporting Limit	Units	Date Analyzed
<b>Calcium</b>	<b>27.8</b>	0.01	mg/L	06/06/18
<b>Magnesium</b>	<b>5.01</b>	0.01	mg/L	06/06/18
<b>Cadmium</b>	<b>0.0001</b>	0.0001	mg/L	06/07/18
<b>Lead</b>	<b>0.002</b>	0.0002	mg/L	06/08/18
<b>Aluminum</b>	<b>0.283</b>	0.012	mg/L	06/06/18
<b>Copper</b>	<b>0.019</b>	0.005	mg/L	06/06/18
<b>Nickel</b>	<b>0.005</b>	0.001	mg/L	06/06/18
<b>Zinc</b>	<b>0.088</b>	0.005	mg/L	06/06/18
<b>Total Hardness</b>	<b>90.0</b>	0.0312	mg/L	06/06/18

# NEW ENGLAND BIOASSAY CHAIN-OF-CUSTODY

## EFFLUENT

Sampler: JIN BOK MCGOWAN  
 Title: CHEMIST  
 Facility: Lowell Regional Wastewater Utilities

Sampling Method: X Composite

Sample ID: \_\_\_\_\_  
 Start Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 End Date: \_\_\_\_\_ Time: \_\_\_\_\_

Sampling Method: ✓ Grab (for pH and TRC only \_\_\_\_\_)

Date Collected: 6-4-2018 11:00 AM  
 Time Collected: \_\_\_\_\_

Sample Type: \_\_\_\_\_ Prechlorinated  
X Dechlorinated  
 \_\_\_\_\_ Unchlorinated  
 \_\_\_\_\_ Chlorinated

## RECEIVING WATER

Sampler: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Facility: Lowell Regional Wastewater Utilities

Sampling Method: X Grab

Sample ID: Merrimack River  
 Date Collected: \_\_\_\_\_  
 Time Collected: \_\_\_\_\_

Received  
ON ICE

Effluent Sampling Location and Procedures: Plant outfall after dechlorination. 24 hr. composite.

Receiving Water Sampling Location and Procedures: Merrimack River upstream of the plant discharge at the Hunts Fall Bridge. (Rt.38)

Requested Analysis: X Chronic and modified acute

## Sample Shipment

Method of Shipment: New England Testing Labs

Relinquished By: [Signature]  
 Received By: [Signature]  
 Relinquished By: [Signature]  
 Received By: [Signature]  
 Relinquished By: [Signature]  
 Received By: [Signature]

Date: <u>6-4-18</u>	Time: <u>1200 PM</u>
Date: <u>6/4/18</u>	Time: <u>1300</u>
Date: <u>6/4/18</u>	Time: <u>1450</u>
Date: <u>6-4-18</u>	Time: <u>1450</u>
Date: <u>6-4-18</u>	Time: <u>1550</u>
Date: <u>6-4-18</u>	Time: <u>1550</u>

## FOR NEB USE ONLY

**\* Please return all ice packs NEB has provided to insure accurate temperature upon receipt to the NEB laboratory \***

Temperature of Effluent Upon Receipt at Lab: 8.1°C

Temperature of Receiving Water Upon Receipt at Lab: \_\_\_\_\_°C

Effluent COC# C58-2299

Receiving Water COC# \_\_\_\_\_

**IF THIS COOLER IS MISPLACED OR THE LABEL IS LOST, PLEASE SHIP TO:  
 KIM WILLS, NEW ENGLAND BIOASSAY, 77 BATSON DRIVE, MANCHESTER CT 06042**



New England Testing Laboratory, Inc.  
(401) 353-3420

## REPORT OF ANALYTICAL RESULTS

**NETLAB Work Order Number: 8F04053**  
**Client Project: Stormwater Bioassay 2X Annual**

Report Date: 27-June-2018

Prepared for:

Tom Kawa  
Lowell Regional Wastewater  
451 First St. Blvd  
Lowell, MA 01852

Richard Warila, Laboratory Director  
New England Testing Laboratory, Inc.  
59 Greenhill Street  
West Warwick, RI 02893  
rich.warila@newenglandtesting.com

## ***Samples Submitted:***

The samples listed below were submitted to New England Testing Laboratory on 06/04/18. The group of samples appearing in this report was assigned an internal identification number (case number) for laboratory information management purposes. The client's designations for the individual samples, along with our case numbers, are used to identify the samples in this report. This report of analytical results pertains only to the sample(s) provided to us by the client which are indicated on the custody record. The case number for this sample submission is 8F04053. Custody records are included in this report.

<b>Lab ID</b>	<b>Sample</b>	<b>Matrix</b>	<b>Date Sampled</b>
8F04053-01	Semi Annual Whole Eff	Water	06/04/2018

## **Request for Analysis**

At the client's request, the analyses presented in the following table were performed on the samples submitted.

### **Semi Annual Whole Eff**

Ammonia	SM4500-NH3-D
Magnesium	SM3120-B
Cadmium	EPA 200.9
Lead	SM3113-B
Aluminum	EPA 200.7
Copper	EPA 200.7
Calcium	SM3120-B
Zinc	EPA 200.7
Total Suspended Solids	SM2540-D
Total Kjeldahl Nitrogen	SM4500NH3-D
Nitrate and Nitrite as N	4500-N03-E
Total Dissolved Solids	SM2540-C
Total Organic Carbon	SM5310-C
Total Phosphorous	SM4500-P-E
Total Solids	SM2540-C
Nickel	EPA 200.7

The analytical methods provided are documented in the following references:

*Manual of Methods for Chemical Analysis of Water and Water Wastes*, EPA-600/4-79-020 (Revised 1983), USEPA/EMSL.

*Standard Methods for the Examination of Water and Wastewater*, 20th Edition, 1998, APHA, AWWA-WPCF.

40 CFR 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act*, Office of Federal Register National Archives and Records Administration.

## ***Results:***

**Sample: Semi Annual Whole Eff  
8F04053-01 (Water)**

### **General Chemistry**

	Result	Reporting Limit	Units	Date Analyzed
<b>Ammonia</b>	<b>11.8</b>	0.5	mg/L	06/08/18
<b>Kjeldahl Nitrogen</b>	<b>12.3</b>	1.0	mg/L	06/06/18
<b>Nitrate and Nitrite as N</b>	<b>4.82</b>	0.15	mg/L	06/06/18
<b>Total Dissolved Solids</b>	<b>524</b>	10	mg/L	06/06/18
<b>Total Organic Carbon</b>	<b>14.6</b>	1.0	mg/L	06/08/18
<b>Total Phosphorous</b>	<b>3.11</b>	0.10	mg/L	06/05/18
<b>Total solids (TS)</b>	<b>644</b>	10	mg/L	06/05/18
<b>Total Suspended Solids</b>	<b>61</b>	4	mg/L	06/07/18

### **Total Metals**

	Result	Reporting Limit	Units	Date Analyzed
<b>Calcium</b>	<b>27.8</b>	0.01	mg/L	06/06/18
<b>Magnesium</b>	<b>5.01</b>	0.01	mg/L	06/06/18
<b>Cadmium</b>	<b>0.0001</b>	0.0001	mg/L	06/07/18
<b>Lead</b>	<b>0.002</b>	0.0002	mg/L	06/08/18
<b>Aluminum</b>	<b>0.283</b>	0.012	mg/L	06/06/18
<b>Copper</b>	<b>0.019</b>	0.005	mg/L	06/06/18
<b>Nickel</b>	<b>0.005</b>	0.001	mg/L	06/06/18
<b>Zinc</b>	<b>0.088</b>	0.005	mg/L	06/06/18
<b>Total Hardness</b>	<b>90.0</b>	0.0312	mg/L	06/06/18

### **Case Narrative**

The samples were all appropriately cooled and preserved upon receipt. The samples were received in the appropriate containers. The chain of custody was adequately completed and corresponded to the samples submitted.

All samples were analyzed in accordance with 40 CFR 136 approved methodologies.



Y, INC.

## CHAIN OF CUSTODY RECORD

[illegible]

401 354 8951